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NEW JERSEY DEPT OF ENVIRONMENTAL PROTECTION TRENTON F/0 13/13  
NATIONAL DAM SAFETY PROGRAM, ENGLISHTOWN LAKE DAM (NJ00619), RA-ETC(U)  
JUL 81 J J WILLIAMS DACW61-79-C-0011

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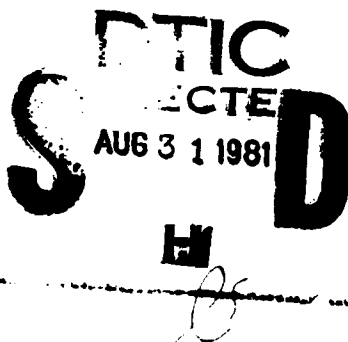
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RARITAN RIVER BASIN  
WEAMACONK CREEK,  
MONMOUTH COUNTY  
NEW JERSEY

# ENGLISHTOWN LAKE DAM

**NJ 00619**

## PHASE 1 INSPECTION REPORT NATIONAL DAM SAFETY PROGRAM



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DEPARTMENT OF THE ARMY

Philadelphia District  
Corps of Engineers  
Philadelphia, Pennsylvania

JULY 1981

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report cites results of a technical investigation as to the dam's adequacy. The inspection and evaluation of the dam is as prescribed by the National Dam Inspection Act, Public Law 92-367. The technical investigation includes visual inspection, review of available design and construction records, and preliminary structural and hydraulic and hydrologic calculations, as applicable. An assessment of the dam's general condition is included in the report.		



DEPARTMENT OF THE ARMY  
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS  
CUSTOM HOUSE-2 D & CHESTNUT STREETS  
PHILADELPHIA, PENNSYLVANIA 19106

IN REPLY REFER TO

NAPEN-N

Honorable Brendan T. Byrne  
Governor of New Jersey  
Trenton, New Jersey 08621

21 AUG 1981

Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for Englishtown Lake Dam in Monmouth County, New Jersey which has been prepared under authorization of the Dam Inspection Act, Public Law 92-367. A brief assessment of the dam's condition is given in the front of the report.

Based on visual inspection, available records, calculations and past operational performance, Englishtown Lake Dam, initially listed as a high hazard potential structure, but reduced to a significant hazard potential structure as a result of this inspection, is judged to be in poor overall condition. The dam's spillway is considered inadequate because a flow equivalent to 11 percent of the Spillway Design Flood - SDF - would cause the dam to be overtopped. (The SDF, in this instance is one half of the Probable Maximum Flood). To ensure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The spillway's adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures and studies within six months from the date of approval of this report. Within three months of the consultant's findings remedial measures to ensure spillway adequacy should be initiated. In the interim, during periods of unusually heavy precipitation, around the clock surveillance should be provided.

b. The following remedial actions should be initiated within six months from the date of approval of this report:

(1) The concrete spillway and bridge abutments should be repaired to limit further deterioration and assure structural integrity.

(2) The embankment should be cleared of trees and brush and any resulting voids backfilled with suitable material and compacted. A vegetative covering should be established on the embankment.

NAPEN-N

Honorable Brendan T. Byrne

(3) The operational condition of the reservoir drain gate should be assessed and repaired if necessary.

(4) Protective fencing placed along the timber bulkhead should be considered.

c. The owner should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam, within one year from the date of approval of this report.

d. An emergency action plan and warning system should be developed which outlines actions to be taken by the owner to minimize the downstream effects of an emergency at the dam within six months from the date of approval of this report.

A copy of the report is being furnished to Mr. Dirk C. Hofman, New Jersey Department of Environmental Protection, the designated State Office contact for this program. Within five days of the date of this letter, a copy will also be sent to Congressman Howard of the Third District. Under the provision of the Freedom of Information Act, the inspection report will be subject to release by this office, upon request, five days after the date of this letter.

Additional copies of this report may be obtained from the National Technical Information Services (NTIS), Springfield, Virginia 22161 at a reasonable cost. Please allow four to six weeks from the date of this letter for NTIS to have copies of the report available.

An important aspect of the Dam Inspection Program will be the implementation of the recommendations made as a result of the inspection. We accordingly request that we be advised of proposed actions taken by the State to implement our recommendations.

Sincerely,



ROGER L. BALDWIN  
Lieutenant Colonel, Corps of Engineers  
Commander and District Engineer

1 Incl  
As stated

Copies furnished:  
Mr. Dirk C. Hofman, P.E., Deputy Director  
Division of Water Resources  
N.J. Dept. of Environmental Protection  
P.O. Box CN029  
Trenton, NJ 08625

Mr. John O'Dowd, Acting Chief  
Bureau of Flood Plain Regulation  
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N.J. Dept. of Environmental Protection  
P.O. Box CN029  
Trenton, NJ 08625

ENGLISHTOWN LAKE DAM (NJ00619)

CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

This dam was inspected on 30 April 1981 by O'Brien and Gere Engineers, Inc., under contract to the U.S. Army Engineer District, Philadelphia, in accordance with the National Dam Inspection Act, Public Law 92-367.

Englishtown Lake Dam, initially listed as a high hazard potential structure, but reduced to a significant hazard potential structure as a result of this inspection, is judged to be in poor overall condition. The dam's spillway is considered inadequate because a flow equivalent to 11 percent of the Spillway Design Flood - SDF - would cause the dam to be overtopped. (The SDF, in this instance is one half of the Probable Maximum Flood). To ensure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The spillway's adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures and studies within six months from the date of approval of this report. Within three months of the consultant's findings remedial measures to ensure spillway adequacy should be initiated. In the interim, during periods of unusually heavy precipitation, around the clock surveillance should be provided.

b. The following remedial actions should be initiated within six months from the date of approval of this report:

(1) The concrete spillway and bridge abutments should be repaired to limit further deterioration and assure structural integrity.

(2) The embankment should be cleared of trees and brush and any resulting voids backfilled with suitable material and compacted. A vegetative covering should be established on the embankment.

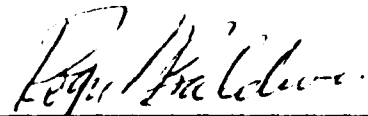
(3) The operational condition of the reservoir drain gate should be assessed and repaired if necessary.

(4) Protective fencing placed along the timber bulkhead should be considered.

c. The owner should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam, within one year from the date of approval of this report.

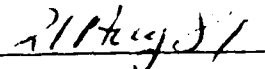
d. An emergency action plan and warning system should be developed which outlines actions to be taken by the owner to minimize the downstream effects of an emergency at the dam within six months from the date of approval of this report.

APPROVED:

  
ROGER L. BALDWIN

Lieutenant Colonel, Corps of Engineers  
Commander and District Engineer

DATE:



## PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.



PHASE I REPORT  
NATIONAL DAM INSPECTION PROGRAM

Name of Dam:	Englishtown Lake Dam
State Located:	New Jersey ID #NJ 00619
County Located:	Monmouth
Stream:	Weamaconk Creek
Coordinates:	Latitude 40° 17.6', Longitude 74° 21.5'
Date of Inspection:	April 30 and June 3, 1981

ASSESSMENT

Based on visual observations made during the inspection, information provided by the New Jersey Department of Environmental Protection (NJDEP), and conversations with local residents, Englishtown Lake Dam is considered to be in poor overall condition. The dam is an earth embankment about 325 feet long and 13 feet high. The embankment has a crest width of about 48 feet. A paved roadway is located on the dam crest. The spillway is a concrete gravity structure located approximately 60 feet from the right abutment.

The dam is classified as "Small" size. Based on the potential for possible loss of life and appreciable property damage as a result of a dam failure, the structure is judged to be a "Significant" hazard. Accordingly the Spillway Design Flood (SDF) ranges from the 100 year flood and fifty percent of the Probable Maximum Flood (PMF). Fifty percent of the PMF was selected as the SDF. The SDF hydrograph was developed and routed through the structure. Based on a review of the results, the spillway is capable of passing five percent of the PMF prior to overtopping the embankment. The spillway is therefore classified as "Inadequate".

The Owner should retain the services of a licensed professional engineer experienced in the design and construction of dams to assist in complying with the following recommendations and remedial measures.

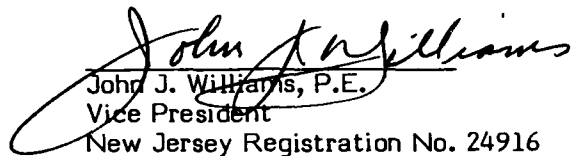
Recommendations and remedial measures which should be implemented soon are as follows:

a. Facilities.

1. Further hydrologic/hydraulic analyses should be performed to determine the extent of mitigating measures necessary to provide adequate spillway capacity.
2. The concrete spillway and bridge abutments should be repaired to limit further deterioration and assure structural integrity.
3. The embankment should be cleared of trees and brush and any resulting voids backfilled with suitable material and compacted. A vegetative covering should be established on the embankment.

4. The operational condition of the reservoir drain gate should be assessed and repaired if necessary.
5. Protective fencing placed along the timber bulkhead should be considered.
- b. Operation and Maintenance Procedures
  1. The Owner should develop and implement a maintenance and inspection checklist to insure that all items associated with the structure are maintained on a regular basis.
  2. The structure should be monitored during periods of heavy discharges. A warning system should be developed and implemented when necessary to warn downstream residents.

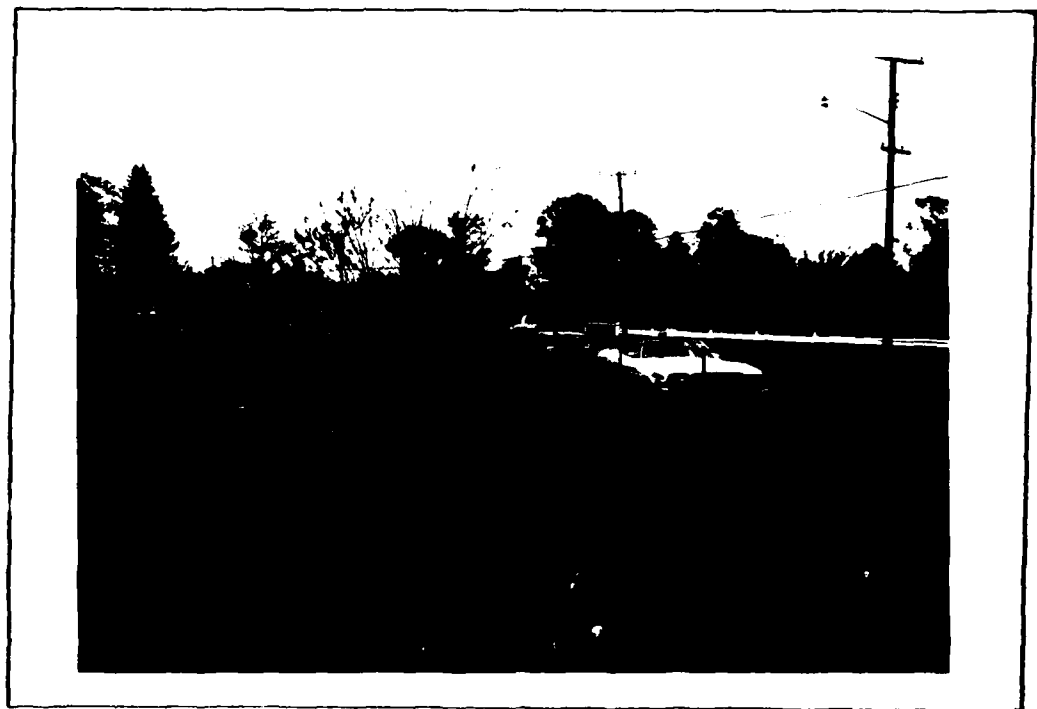
O'BRIEN & GERE ENGINEERS, INC.

  
John J. Williams, P.E.  
Vice President  
New Jersey Registration No. 24916

Date: 28 July 1981



UPSTREAM OVERVIEW OF ENGLISHTOWN LAKE DAM AS OBSERVED FROM THE LEFT ABUTMENT. (4/30/81)



DOWNSTREAM OVERVIEW OF ENGLISHTOWN LAKE DAM AS OBSERVED FROM THE LEFT ABUTMENT. (4/30/81)

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PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM  
ENGLISHTOWN LAKE DAM  
INVENTORY NUMBER NJ 00619

SECTION 1

PROJECT INFORMATION

1.1 General

a. Authority. This report is authorized by the Dam Inspection Act, Public Law 92-367, and has been prepared in accordance with contract # DACW61-80-D-0013 between O'Brien & Gere Engineers, Inc. and the United States Army Corps of Engineers, Philadelphia District.

b. Purpose of Inspection. The purpose of the inspection is to evaluate the structural and hydraulic condition of Englishtown Lake Dam and appurtenant structures and to determine if the dam constitutes a hazard to human life or property.

1.2 Project Description (Based on information provided by the New Jersey Department of Environmental Protection (NJDEP) and supplemented by field observations.)

a. Description of Dam and Appurtenances. Englishtown Lake Dam is an earth embankment approximately 48 feet wide at the crest, 13 feet high and 325 feet long. County Route 527 is located on the crest of the dam embankment.

The upstream slope of the embankment is retained by a creosoted timber bulkhead, while the downstream face of the dam is constructed on a slope of about 2.5H:1V.

A concrete gravity spillway about 45 feet long is located approximately 60 feet from the right abutment. Spillway discharge passes under a bridge to the natural downstream channel. A four-foot diameter reservoir drain is located at the right side of the spillway. Discharge from the reservoir drain enters the spillway discharge channel. The operating mechanism for the drain valve is accessible from the spillway crest. A sketch of the structure is included as Figure 2, Appendix E.

b. Location. Englishtown Lake Dam is located on Weamaconk Creek, in Englishtown, Monmouth County, New Jersey, about 800 feet south of the intersection of New Jersey County Routes 522 and 527. County Route 527 is constructed on the crest of the embankment. The dam site is shown on the USGS Quadrangle Sheet entitled "Freehold, New Jersey" at coordinates N 40° 17.6', W 74° 21.5'. A regional location plan of Englishtown Lake Dam is enclosed as Figure 1, Appendix E.

c. Size Classification. Englishtown Lake Dam has a maximum height of about 13 feet and a storage capacity of 93 acre-feet at the low point of the top of the dam. Accordingly, the dam is classified as a "Small" size dam (height less than 40 feet, storage less than 1,000 acre-feet).

d. Hazard Classification. An automobile repair shop is located about 1,500 feet downstream of the dam. The elevation of the shop is about four feet above the stream bed. An inhabitable dwelling is also located in this area; its relative elevation is about six feet above the streambed. Utility pipelines are located along the top of the dam. Since a failure of the dam would result in damage to only two inhabitable structures, utility pipelines and the possible loss of a few lives, the structure is classified as a "Significant" hazard potential dam.

e. Ownership. The dam is owned by Monmouth County, New Jersey, 1 Lafayette Place, Freehold, NJ 07728.

f. Purpose of Dam. The dam was originally constructed to provide hydro-power for a mill which is no longer in existence. The dam is currently used to provide a pond for recreation.

g. Design and Construction History. No information relative to the design and construction history of the dam is known to exist. Based on information gained through interviews with local residents, the dam was constructed prior to 1920 for hydropower.

A correspondence file relative to this structure was provided by the State of New Jersey, Department of Environmental Protection (NJDEP). An inspection report dated May 1925, was included in this file. A review of this report reveals that the mill for which the dam was constructed had been destroyed by fire. Further review of this file indicates that minor repairs consisting of guniting and pressure grouting of the structure were performed in 1968. The most recent correspondence included in this file, from July 1978, documents a request made by the NJDEP for repair of the spillway. No response to this request is included in the file.

According to local residents, Monmouth County repaired the reservoir drain valve approximately 5 years ago.

h. Normal Operating Procedure. A representative of the Owner was not available for the inspection of Englishtown Lake Dam. Normal operating procedures are unknown. It does not appear that the reservoir drain is exercised on a scheduled basis. The last time local residents recall a gate operation was during the repairs made in 1976.

### 1.3 Pertinent Data

a. <u>Drainage Area.</u> (square miles)	7.2
b. <u>Discharge at Dam Site.</u> (cfs)	
Low Point Top of Dam, Elev. 75.0	650
c. <u>Elevations.</u> (feet above NGVD, estimated from USGS Quad)	
Spillway Crest	72.15
Low Point Top of Dam	75.00

Reservoir Drain Invert	64.15
Streambed at Toe of Dam	62.0
Tailwater	+64.5
d. <u>Reservoir Length. (feet)</u>	
Normal Pool, Elev. 72.2	1,400
Low Point Top of Dam, Elev. 75.0	3,900
e. <u>Reservoir Storage. (acre-feet)</u>	
Normal Pool, Elev. 72.2	24.0
Low Point Top of Dam, Elev. 75.0	93.0
f. <u>Reservoir Surface Area. (acres)</u>	
Normal Pool, Elev. 72.2	7.0
Low Point Top of Dam, Elev. 75.0	80.0
g. <u>Dam.</u>	
Type	Earth Embankment
Length	+325 feet
Height	+13 feet
Crest Width	48 feet
Side Slopes Upstream	Vertical (retained by timber bulkhead
Downstream	2.5H:1V
Zoning	Unknown
Impervious Core	Unknown
Cutoff	Unknown
Grout Curtain	Unknown
h. <u>Spillway.</u>	
Type	Concrete Gravity
Length	+50 feet
Height	+10 feet
i. <u>Diversion and Regulating Structures</u>	
None	
j. <u>Reservoir Drain</u>	

The reservoir drain is a 48-inch diameter pipe which has a submerged intake. The outlet protrudes from near the right side of the spillway structure. The gate operator is accessible from the spillway crest. The operating wheel is stored at the Borough of Englishtown, Town Hall.



SECTION 2  
ENGINEERING DATA

2.1 Design

a. Data Available. No engineering data, relative to the design of Englishtown Lake Dam, were provided for review.

2.2 Construction. No engineering data, relative to the construction of Englishtown Lake Dam, were provided for review.

2.3 Operation. No documented information, relative to operational features of Englishtown Lake Dam, was provided. According to local residents, no operations are performed at the dam.

2.4 Evaluation

a. Availability. No engineering data were provided for this report.

b. Adequacy. Although design and construction information relative to the original dam are not available, the observations made during the field inspection, the information in the correspondence provided by NJDEP and interviews with local residents provided adequate data for a Phase I evaluation.

c. Validity. There is no reason to question the validity of the limited data provided by NJDEP.

### SECTION 3

#### VISUAL INSPECTION

##### 3.1 Findings

a. General. Englishtown Lake Dam was inspected on April 30 and June 3, 1981. At the time the inspections, the water surface elevation was less than 0.1 feet above the spillway crest. No underwater areas were inspected. The observations and comments of the field inspection team are in the checklist which is appendix B of this report. The appearance of the facility indicates that the dam and its appurtenances are inadequately maintained.

b. Dam. The horizontal and vertical alignment of the timber bulkhead which retains the upstream slope of the embankment appears to be good. The face planking and timber support piles appear to be treated. No deterioration of the members was observed above the waterline. No cracks or settlement in the pavement were observed. A number of small trees are planted in the upstream shoulder of the road. The remainder of the upstream shoulder is grass covered except for a footpath which has been worn in the grass covered shoulder immediately downstream of the timber bulkhead. The downstream face of the dam is covered with brush and a number of small trees. No seepage was observed along the toe of the slope.

The upstream slope of the concrete spillway is submerged. The concrete slabs on the crest of the spillway are cracked and badly spalled. Reinforcing steel is exposed on the crest and downstream face of the spillway and a number of horizontal cracks were noted in the downstream face. The concrete in the toe area of the spillway is protected with a steel sheet-pile wall. The steel sheeting appears to be in good condition.

The spillway appears to be structurally tied into the abutments of the highway bridge. The bridge abutments appear to be a concrete/masonry composite. Cracks which appear to be structural, were noted in both bridge abutments. Superficial cracking and spalling was also evident in the bridge abutments.

c. Appurtenant Structures. The gate structure for the reservoir drain appears to be in good condition. No seepage was noted to be discharging from or along the gate. The concrete housing the gate is badly spalled.

d. Reservoir Area. The reservoir slopes are relatively flat and appear to be protected with vegetative cover. No slope stability problems were observed along the perimeter of the reservoir.

e. Downstream Channel. Discharge from the spillway enters the natural channel downstream of the dam. The channel is about twenty feet wide with a mild slope. The overbanks are grass covered and relatively flat.

SECTION 4  
OPERATIONAL FEATURES

4.1 Procedures

Based on a review of all available information, it appears that no formal or informal operational procedures are established for Englishtown Lake Dam.

4.2 Maintenance of the Dam

Based on a review of all available information, it appears that no formal or informal scheduled maintenance procedures are in effect for Englishtown Lake Dam. According to information contained in the correspondence files supplied by NJDEP, limited guniting and pressure grouting repairs were made on the spillway in 1968. According to local residents, Monmouth County repaired the reservoir drain valve approximately five years ago.

4.3 Maintenance of Operating Facilities

Based on a review of all available information, it appears that no formal or informal scheduled maintenance procedures relative to operating facilities are in effect for Englishtown Lake Dam.

4.4 Description of Any Warning Systems in Effect

Based on a review of all available information, it appears that no warning system is in effect for Englishtown Lake Dam.

4.5 Evaluation of Operational Adequacy

The operational condition of the reservoir drain structure is unknown. It appears that the dam would be accessible for all weather conditions.

## SECTION 5

### HYDROLOGY AND HYDRAULICS

#### 5.1 Evaluation of Features

a. Design Data Based on a review of the Reference Data sheet dated May 27, 1925, in the correspondence file provided by NJDEP, the drainage area contributing to Englishtown Lake Dam is 7.2 square miles. The length of the spillway was 56.5 feet and the available freeboard at the time of the report was one foot. The discharge capacity of the spillway was reported to be 23 cfs per square mile.

Presently, the spillway is about 45 feet long (crest Elevation 72.15) and the discharge at the low point of the top of the dam, Elevation 75.0, is about 650 cfs.

For further information, refer to the calculations and computer printout included in Appendix C of this report.

b. Experience Data. Based on a review of all available information, it appears that no reservoir stage or rainfall records are maintained for this dam. According to local residents, the embankment has not been overtopped during the past fifty years.

c. Visual Observations. At the time of the inspections, the spillway appeared to be in poor condition with extensive cracking and spalling of the concrete as well as exposed reinforcing bars.

The operational condition of the reservoir drain gate was not assessed during the inspection. However, the gate appeared to be in good condition.

d. Overtopping Potential. Englishtown Lake Dam is classified as a "Small" size, "Significant" hazard structure. Accordingly, the Spillway Design Flood (SDF) ranges from the one hundred year flood to fifty percent of the Probable Maximum Flood (PMF). The SDF selected is fifty percent of the PMF because of the chance for appreciable damage and the possibility of loss of life at an automobile repair garage and at an inhabited dwelling about 1,500 feet downstream of the dam. The SDF hydrograph was developed and routed through the reservoir with the starting water surface elevation at the spillway crest (Elevation 72.15). The results of the routing are presented in Appendix C.

A review of these results indicates that the spillway is capable of discharging about five percent of the PMF prior to overtopping the dam. The peak inflow and outflow for the SDF are about 8,219 and 7,874 cfs, respectively. The maximum reservoir stage for this event is about 3.8 feet above the low point of the top of the dam and the period for overtopping is about 12.33 hours.

e. Spillway Adequacy. The spillway is capable of discharging about five percent of the PMF prior to overtopping the embankment. The spillway is judged to be "Inadequate".

SECTION 6  
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations. The overall structural appearance of the embankment at the time of the inspection was good. No evidence of slope settlement, instability or seepage was noted.

The condition of the spillway is poor. The concrete is cracked and badly spalled. Reinforcing steel is exposed in the crest and in the downstream face of the spillway structure. The adjoining bridge abutments also appear to be in poor condition. Cracks evident in the abutments appear to be structural in nature.

b. Design and Construction Data. No design or construction data was made available.

c. Operating Records. Based on a review of all available information, it appears that no operating records are maintained for this dam.

d. Post-Construction Changes. Based on a review of all available information, it appears that no post construction changes have been made.

e. Seismic Stability. Englishtown Lake Dam is located in Seismic Risk Zone 1 of the "Seismic Zone Map of Contiguous States". A dam located in Seismic Zone 1 is generally considered to be structurally adequate for Zone 1 earthquake loading if it is structurally adequate for static loading.

Based on observations made during the visual inspection, the dam appears to be stable for any expected static load conditions.

## SECTION 7

### ASSESSMENT, RECOMMENDATIONS AND PROPOSED REMEDIAL MEASURES

#### 7.1 Dam Assessment

a. Evaluation. Based on the visual inspection, Englishtown Lake Dam is judged to be in poor condition. The concrete in the spillway is cracked and badly spalled with reinforcing steel exposed in the crest and downstream face. The adjoining bridge abutments appear to be structurally cracked. The operational condition of the reservoir drain is unknown.

The embankment portion of the dam appears to be in satisfactory condition except for small trees and brush growing on the crest and downstream face.

The SDF chosen for Englishtown Lake Dam is fifty percent of the PMF. A review of the hydrologic/hydraulic analyses indicates that the spillway is capable of discharging about five percent of the PMF prior to overtopping. The spillway is classified as "Inadequate".

b. Adequacy of Information. Information gained from the field investigation, from the files of NJDEP and interviews with local residents provided adequate data for a Phase I evaluation.

c. Urgency. The remedial measures recommended in Section 7.2 should be initiated soon.

d. Necessity for Further Investigation. Further investigations should be performed in accordance with 7.2.a, items 1 and 2.

#### 7.2 Recommendations and Remedial Measures

The Owner should retain the services of a licensed professional engineer experienced in the design and construction of dams to assist in complying with the following recommendations and remedial measures.

The recommendations and remedial measures should be initiated soon.

##### a. Facilities.

1. Further hydrologic/hydraulic analyses should be performed to determine the extent of mitigating measures necessary to provide adequate spillway capacity.
2. The concrete spillway and bridge abutments should be repaired to limit further deterioration and assure structural integrity.
3. The embankment should be cleared of trees and brush and any resulting voids backfilled with suitable material and compacted. A vegetative covering should be established on the embankment.

4. The operational condition of the reservoir drain gate should be assessed and the structure repaired if necessary.

5. Protective fencing placed along the timber bulkhead should be considered.

b. Operation and Maintenance Procedures

1. The Owner should develop and implement a maintenance and inspection checklist to insure that all items associated with the structure are maintained on a regular basis.

2. The structure should be monitored during periods of heavy discharges. A warning system should be developed and implemented when necessary to warn downstream residents.

## SECTION 5

### HYDROLOGY AND HYDRAULICS

#### 5.1 Evaluation of Features

a. Design Data. Based on a review of the Reference Data sheet dated May 27, 1925, in the correspondence file provided by NJDEP, the drainage area contributing to Englishtown Lake Dam is 7.2 square miles. The length of the spillway was 56.5 feet and the available freeboard at the time of the report was one foot. The discharge capacity of the spillway was reported to be 23 cfs per square mile.

Presently, the spillway is about 45 feet long (crest Elevation 72.15) and the discharge at the low point of the top of the dam, Elevation 75.0, is about 650 cfs.

For further information, refer to the calculations and computer printout included in Appendix C of this report.

b. Experience Data. Based on a review of all available information, it appears that no reservoir stage or rainfall records are maintained for this dam. According to local residents, the embankment has not been overtopped during the past fifty years.

With the impoundment level at normal pool, Elevation 72.15, it would take approximately 4 hours to draw the reservoir down about 7.5 feet to Elevation 64.65. This is essentially the level of the water in the impoundment with the 4-foot diameter reservoir drain gate fully open with the base flow discharging through the site.

c. Visual Observations. At the time of the inspections, the spillway appeared to be in poor condition with extensive cracking and spalling of the concrete as well as exposed reinforcing bars.

The operational condition of the reservoir drain gate was not assessed during the inspection. However, the gate appeared to be in good condition.

d. Overtopping Potential. Englishtown Lake Dam is classified as a "Small" size, "Significant" hazard structure. Accordingly, the Spillway Design Flood (SDF) ranges from the one hundred year flood to fifty percent of the Probable Maximum Flood PMF). The SDF selected is fifty percent of the PMF because of the chance for appreciable damage and the possibility of loss of life at an automobile repair garage and at an inhabited dwelling about 1,500 feet downstream of the dam. The SDF hydrograph was developed and routed through the reservoir with the starting water surface elevation at the spillway crest (Elevation 72.15). The results of the routing are presented in Appendix C.



A review of these results indicates that the spillway is capable of discharging about five percent of the PMF prior to overtopping the dam. The peak inflow and outflow for the SDF are about 8,219 and 7,874 cfs, respectively. The maximum reservoir stage for this event is about 3.8 feet above the low point of the top of the dam and the period for overtopping is about 12.33 hours.

e. Spillway Adequacy. The spillway is capable of discharging about five percent of the PMF prior to overtopping the embankment. The spillway is judged to be "Inadequate".

## SECTION 6

### STRUCTURAL STABILITY

#### 6.1 Evaluation of Structural Stability

a. Visual Observations. The overall structural appearance of the embankment at the time of the inspection was good. No evidence of slope settlement, instability or seepage was noted.

The condition of the spillway is poor. The concrete is cracked and badly spalled. Reinforcing steel is exposed in the crest and in the downstream face of the spillway structure. The adjoining bridge abutments also appear to be in poor condition. Cracks evident in the abutments appear to be structural in nature.

b. Design and Construction Data. No design or construction data was made available.

c. Operating Records. Based on a review of all available information, it appears that no operating records are maintained for this dam.

d. Post-Construction Changes. Based on a review of all available information, it appears that no post construction changes have been made.

e. Seismic Stability. Englishtown Lake Dam is located in Seismic Risk Zone 1 of the "Seismic Zone Map of Contiguous States". A dam located in Seismic Zone 1 is generally considered to be structurally adequate for Zone 1 earthquake loading if it is structurally adequate for static loading.

Based on observations made during the visual inspection, the dam appears to be stable for any expected static load conditions.

## SECTION 7

### ASSESSMENT, RECOMMENDATIONS AND PROPOSED REMEDIAL MEASURES

#### 7.1 Dam Assessment

a. Evaluation. Based on the visual inspection, Englishtown Lake Dam is judged to be in poor condition. The concrete in the spillway is cracked and badly spalled with reinforcing steel exposed in the crest and downstream face. The adjoining bridge abutments appear to be structurally cracked. The operational condition of the reservoir drain is unknown.

The embankment portion of the dam appears to be in satisfactory condition except for small trees and brush growing on the crest and downstream face.

The SDF chosen for Englishtown Lake Dam is fifty percent of the PMF. A review of the hydrologic/hydraulic analyses indicates that the spillway is capable of discharging about five percent of the PMF prior to overtopping. The spillway is classified as "Inadequate".

b. Adequacy of Information. Information gained from the field investigation, from the files of NJDEP and interviews with local residents provided adequate data for a Phase I evaluation.

c. Urgency. The remedial measures recommended in Section 7.2 should be initiated soon.

d. Necessity for Further Investigation. Further investigations should be performed in accordance with 7.2.a, items 1 and 2.

#### 7.2 Recommendations and Remedial Measures

The Owner should retain the services of a licensed professional engineer experienced in the design and construction of dams to assist in complying with the following recommendations and remedial measures.

The recommendations and remedial measures should be initiated soon.

##### a. Facilities.

1. Further hydrologic/hydraulic analyses should be performed to determine the extent of mitigating measures necessary to provide adequate spillway capacity.
2. The concrete spillway and bridge abutments should be repaired to limit further deterioration and assure structural integrity.
3. The embankment should be cleared of trees and brush and any resulting voids backfilled with suitable material and compacted. A vegetative covering should be established on the embankment.

4. The operational condition of the reservoir drain gate should be assessed and the structure repaired if necessary.
5. Protective fencing placed along the timber bulkhead should be considered.
- b. Operation and Maintenance Procedures
  1. The Owner should develop and implement a maintenance and inspection checklist to insure that all items associated with the structure are maintained on a regular basis.
  2. The structure should be monitored during periods of heavy discharges. A warning system should be developed and implemented when necessary to warn downstream residents.

APPENDIX

A

Check List Engineering Data  
Design, Construction, Operation  
Phase I

CHECK LIST  
ENGINEERING DATA  
DESIGN, CONSTRUCTION, OPERATION  
PHASE I

NAME OF DAM Englishtown Lake Dam  
ID # NJ 00619

Sheet 1 of 4

ITEM	REMARKS
AS-BUILT DRAWINGS	No drawings were made available.
REGIONAL VICINITY MAP	Refer to Appendix E, Figure 1.
CONSTRUCTION HISTORY	No information was made available.
TYPICAL SECTIONS OF DAM	No drawings were made available.
OUTLETS - PLAIN DETAILS CONSTRAINTS	No drawings were made available.
DISCHARGE RATINGS	Refer to Section 5.1 a.
RAINFALL/RESERVOIR RECORDS	No information was made available.

CHECK LIST

NAME OF DAM Englishtown Pond Dam

ENGINEERING DATA

DESIGN, CONSTRUCTION, OPERATION

PHASE 1

ID # NJ 00619

SHEET 1 OF 4

ITEM

REMARKS

AS-BUILT DRAWINGS

No drawings were made available.

REGIONAL VICINITY MAP

Refer to Appendix E, Figure 1.

CONSTRUCTION HISTORY

No information was made available.

TYPICAL SECTIONS OF DAM

No drawings were made available.

OUTLETS - PLANT

DETAILS

CONSTRAINTS

No drawings were made available.

DISCHARGE RATINGS

Refer to Section 5.1 a.

RAINFALL/RESERVOIR RECORDS

No information was made available.

ITEM	REMARKS
DESIGN REPORTS	No information was made available.
GEOLOGY REPORTS	No information was made available.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	No information was made available.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	No information was made available.
POST-CONSTRUCTION SURVEYS OF DAM	No information was made available.
BORROW SOURCES	No information was made available.



ITEM	REMARKS
MONITORING SYSTEMS	None noted.
MODIFICATIONS	No information was made available.
HIGH POOL RECORDS	No information was made available.
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	No information was made available.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	No information was made available.
MAINTENANCE OPERATION RECORDS	No information was made available.

ITEM	REMARKS
SPILLWAY PLAN	No drawings were made available.
SECTIONS	
DETAILS	
OPERATING EQUIPMENT PLANS & DETAILS	No drawings were made available.
MISCELLANEOUS	

APPENDIX

B

Check List

Visual Inspection

Phase I

CHECK LIST  
VISUAL INSPECTION  
PHASE I

Sheet 1 of 8

Name Dam Englishtown Lake Dam County Monmouth State New Jersey National ID # NJ 00619  
Type of Dam Road Embankment w/Concrete Spillway Hazard Category Significant  
Date(s) Inspection 4/30/81 Weather Cloudy Temperature 60°F  
(6/3/81) (4/30/81)

Pool Elevation at Time of Inspection 72.2 ± M.S.L. Tailwater at Time of Inspection 63 ± M.S.L.

Inspection Personnel:

L. Beck L. DeHeer (6/2/81)  
R. Horvath   
J. Rauschkolb   
R. Horvath Recorder

Remarks:

No representative for the Owner was present for the visual inspection.

EMBANKMENT

Sheet 2 of 8

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	None observed.	
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	No significant settlement or misalignment was observed.	
RIPRAP FAILURES	No riprap is in place.	

EMBANKMENT

Sheet 3 of 8

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
-----------------------	--------------	----------------------------

JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM		
---	--	--

No relative movement or seepage  
was noted in these areas.

ANY NOTICEABLE SEEPAGE		
------------------------	--	--

None observed.

STAFF GAGE AND RECORDER		
-------------------------	--	--

None observed.

DRAINS		
--------	--	--

None observed.

Reservoir Drain  
(48 inch diameter)

OUTLET WORKS

Sheet 4 of 8

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	None observed.	
INTAKE STRUCTURE	None observed.	
OUTLET STRUCTURE	Concrete adjacent to gate structure is badly spalled.	
OUTLET CHANNEL	Discharge from the drain enters the spillway channel.	
EMERGENCY GATE	48 inch diameter gate valve.	The operating device is stored in the facilities of the Bourrough Hall.

UNGATED SPILLWAY

Sheet 5 of 8

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	The concrete in the spillway crest and downstream face is cracked and badly spalled. Reinforcing steel is exposed in the crest and downstream face.	
APPROACH CHANNEL	Impoundment	
DISCHARGE CHANNEL	Spillway discharge is directed to the downstream channel by means of a bridged opening through the embankment. The downstream channel is the natural stream.	
BRIDGE AND PIERS	The abutments of the bridge appear to be in poor structural condition.	



INSTRUMENTATION

Sheet 6 of 8

<u>VISUAL EXAMINATION</u>	<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS</u>
---------------------------	---------------------	-----------------------------------

MONUMENTATION/SURVEYS

None observed.

OBSERVATION WELLS

None observed.

WEIRS

None observed.

PIEZOMETERS

None observed.

OTHER

RESERVOIR

Sheet 7 of 8

<u>VISUAL EXAMINATION OF</u>	<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS</u>
------------------------------	---------------------	-----------------------------------

SLOPES

The slopes adjacent to the reservoir are relatively flat. No slope failures were noted.

SEDIMENTATION

No evidence of excessive sedimentation was observed.

DOWNSTREAM CHANNEL

Sheet 8 of 8

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
-----------------------	--------------	----------------------------

CONDITION  
(OBSTRUCTIONS,  
DEBRIS, ETC.)

The downstream channel appears to be free of excessive debris and obstructions.

SLOPES

The channel side slopes are approximately 1 horizontal to 1 vertical. The overbanks are relatively flat.

APPROXIMATE NO.  
OF HOMES AND  
POPULATION

An automobile service station is located about 1500 feet downstream of the dam. It is estimated that the floor elevation is 4 feet above the streambed.

APPENDIX

C

Hydrologic & Hydraulic Data

ENGLISHTOWN LAKE DAM  
APPENDIX C  
HYDROLOGIC AND HYDRAULIC  
ENGINEERING DATA

TABLE OF CONTENTS

	<u>Sheet No.</u>
PMP Data	1
Lag Time Computations	1 through 3
Stage - Area Computations	4
Stage - Storage Computations	6
Stage - Discharge Computations	5
Drawdown Analysis	6
HEC-1, Dam Safety Version, Computer Printout	7 through 9



O'BRIEN &amp; GERE

SUBJECT

ENGLISHTOWN LAKE DAM

SHEET

1

BY

JFR

DATE

5-22-81

JOB NO

1800-006-114

✓ 6/6/81

HYDROLOGY CALCULATIONS

Drainage Area = 7.02 sq. mi.

PMP DATA - HMS REPORT 83

Area is in Zone 6 of PMP All Season Envelope

24 hr., 200 sq. mi. Rainfall = 23.2 in.

Storm Distribution

Hr.	%
6	11.3
12	12.4
24	13.2
48	14.2

BASIN LAG TIME

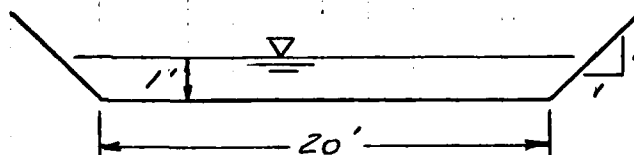
## 1. SCS Upland Method:

Greatest hydraulic distance to reservoir consists of 30,000 ft. of stream flow.

$$\text{Avg. stream slope} = \frac{\Delta E l.}{d} = \frac{160 - 72}{30,000} = 0.0029 \frac{\text{ft}}{\text{ft}}$$

$$V = \frac{1.49}{n} R^{2/3} S^{1/2}$$

Typical Channel Section:



**O'BRIEN & GERE**

SUBJECT

ENGLISHTOWN LAKE DAM

SHEET

2

BY

JFR

DATE

5-22-81

JOB NO

1800-006-114

✓ 6/6/81

$$A = 21 \text{ ft}^2$$

$$P = 20 + 2\sqrt{2} = 22.83 \text{ ft.}$$

$$R = \frac{A}{P} = \frac{21}{22.83} = 0.92$$

$$\text{Assume } n = 0.05$$

$$V = \frac{1.49}{0.05} (0.92)^{2/3} (0.0029)^{1/2} = 1.52 \text{ fps}$$

$$T_c = \frac{30,000}{1.52} = 19,737 \text{ sec.} = 5.48 \text{ hrs.}$$

$$L = 0.6 T_c = 0.6 (5.48) = \underline{\underline{3.29 \text{ hrs.}}}$$

2. SCS Curve Number Method:

$$L = \frac{l^8 (s+1)^7}{1900 Y^5}$$

$$S = \frac{1000}{CN} - 10 = \frac{1000}{90} - 10 = 1.11$$

$$l = 30,000 \text{ ft.}$$

$$Y = 0.29 \%$$

$$L = \frac{(30,000)^8 (2.11)^7}{1900 (.29)^5} = 6.29 \text{ hrs.}$$



SUBJECT	SHEET	BY	DATE	JOB NO
ENGLISHTOWN LAKE DAM	3	JFR	5-22-81	1800-006-114

✓ ~~1/8~~ 6/6/81

### 3. California Highways Method:

$$T_c = \left( \frac{11.9 L^3}{H} \right)^{.385}$$

$$L = 30,000 / 5280 = 5.68 \text{ mi.}$$

$$H = \Delta E_1 = 160 - 72 = 88 \text{ ft.}$$

$$T_c = \left( \frac{11.9 (5.68)^3}{88} \right)^{.385} = 3.44 \text{ hrs.}$$

$$L = 0.6 (3.44) = 2.06 \text{ hrs.}$$

### 4. Kerby Method:

$$T_c = \left( \frac{2}{3} \frac{L n}{\sqrt{s}} \right)^{.467}$$

$$L = 30,000 \text{ ft.}$$

$$n = 0.05$$

$$s = 0.0029 \text{ ft/ft}$$

$$T_c = \left( \frac{2}{3} \frac{(30,000)(.05)}{\sqrt{.0029}} \right)^{.467} = 98 \text{ min.}$$

$$L = 0.6 (98/60) = 0.98 \text{ hrs.}$$

USE  $L = \underline{\underline{3.29 \text{ hrs.}}}$  SCS Upland Method





O'BRIEN &amp; GERE

SUBJECT	SHEET	BY	DATE	JOB NO
Englishtown LAKE Dam	4	REH	5/14/81	1000.006.114

✓ \$ 6/6/81

HYDRAULICSStage - Area Relationship

Areas planimetered from USGS Quad sheet.

<u>Stage *</u>	<u>Area (Acres)</u>
72.15	7
80.0	209
100.0	1,000

\* Eleo, ~~not~~ NGVD

Estimate of Normal Pool Storage

$$V = \frac{h}{3} (A_1 + A_2 + \sqrt{A_1 A_2})$$

h = 10.5 feet  
A<sub>1</sub> = 0, A<sub>2</sub> = 7

$$= \frac{10.5}{3} (7) = 24.5 \text{ Acre Feet}$$



O'BRIEN &amp; GERE

PROJECT	SHEET	BY	DATE	JOB NO
Englishtown Lake Dam	5	REH	5/14/61	18500.000.114

v. B.

6/6/61

HYDRAULICSStage - Discharge, Spillway

Effective length  $\approx 45'$   
 $C \approx 3.$

$$Q = CLH^{3/2} = 135 H^{3/2}$$

<u>WSE</u>	<u>H (ft)</u>	<u>Q spillway (cfs)</u>
72.15	0	0
73.15	1	135
74.15	2	382
75.15	3	701
76.15	4	1080
77.15	5	1509
78.15	6	1984
79.15	7	2500
80.15	8	3055
81.15	9	3645

Stage - Discharge, Embankment Overtopping

length  $280'$   
 $C \approx 2.6$

Low Point Top of Dam = 75.0

**O'BRIEN & GERE**

SUBJECT	SHEET	BY	DATE	JOB NO
ENGLISHTOWN LAKE DAM	6	JFR	7-27-81	1800-006-114

DRAWDOWN ANALYSIS

48"  $\phi$  pipe, invert elev. 64.65  
 Normal Pool elev. 72.15

$$t = \frac{V}{Q}$$

$$V = 0.2299 h^2 \bigg|_{h_1}^{h_2} \text{ Ac-ft; by integration}$$

$$Q = 0.8 A_p \sqrt{2gH} = 80.676 H^{1/2} \text{ cfs}$$

<u>W.S.E.</u>	<u><math>\Delta V</math> (ft<sup>3</sup>)</u>	<u><math>H_{avg.}</math> (ft)</u>	<u><math>Q</math> (cfs)</u>	<u><math>t</math> (sec)</u>
72.15 - 70.65	282,389	4.75	176	1604
70.65 - 69.15	237,327	3.25	145	1637
69.15 - 67.65	192,265	1.75	107	1797
67.65 - 66.15	147,203	.25	40	3680
66.15 - 64.65	102,141	—	20*	<u>5107</u>

\* Inlet control, estimated  $Q$

$$E = 13,825 \text{ sec}$$

$$\frac{13825}{36,400} = 0.16 \text{ days} \approx \underline{\underline{4 \text{ hours}}}$$

NATIONAL DAM INSPECTION PROGRAM  
—ENGLISHMAN LAKE DAM—  
PME HYDROGRAPH

0	-4	0
---	----	---

10	0	0	0	0	0
1					
.03	.04	.05	.06	.07	
RUNOFF HYDROGRAPH TO ENLIGHTENTOWN LAKE					

7.2  
113-----124-----132-----142-----

ROUTING THROUGH ENGLISH TOWN LAKE DAM

-1		
15	80.15	81.15
00	3055	3045

PREVIEW-OF-SEQUENCE-OF-STREAM-NETWORK-CALCULATIONS-

RUNOFF HYDROGRAPH AT LAKE  
ROUTE-HYDROGRAPH-TO-DAN  
END OF NETWORK

NATIONAL DAM INSPECTION PROGRAM  
ENGLISHTOWN LAKE DAM  
PMF HYDROGRAPH

### JOB SPECIFICATION

	JOB DESCRIPTION	IHR	IMIN	METRC	IPLT	IFRT	NSTAN
	IDAY	0	0	0	0	4	0
	JUOFER	5	0	0	0		

295

MULTI-PLAN ANALYSES TO BE PERFORMED

NPLAN=1 NKTI0=9 LKTI0=1

KT105=	KT104=	KT103=	KT102=	KT101=	KT100=
.01	.02	.03	.04	.05	.06
.07	.08	.09	.10	.11	.12
.13	.14	.15	.16	.17	.18
.19	.20	.21	.22	.23	.24
.25	.26	.27	.28	.29	.30
.31	.32	.33	.34	.35	.36
.37	.38	.39	.40	.41	.42
.43	.44	.45	.46	.47	.48
.49	.50	.51	.52	.53	.54
.55	.56	.57	.58	.59	.60
.61	.62	.63	.64	.65	.66
.67	.68	.69	.70	.71	.72
.73	.74	.75	.76	.77	.78
.79	.80	.81	.82	.83	.84
.85	.86	.87	.88	.89	.90
.91	.92	.93	.94	.95	.96
.97	.98	.99	1.00	1.01	1.02
1.03	1.04	1.05	1.06	1.07	1.08
1.09	1.10	1.11	1.12	1.13	1.14
1.15	1.16	1.17	1.18	1.19	1.20
1.21	1.22	1.23	1.24	1.25	1.26
1.27	1.28	1.29	1.30	1.31	1.32
1.33	1.34	1.35	1.36	1.37	1.38
1.39	1.40	1.41	1.42	1.43	1.44
1.45	1.46	1.47	1.48	1.49	1.50
1.51	1.52	1.53	1.54	1.55	1.56
1.57	1.58	1.59	1.60	1.61	1.62
1.63	1.64	1.65	1.66	1.67	1.68
1.69	1.70	1.71	1.72	1.73	1.74
1.75	1.76	1.77	1.78	1.79	1.80
1.81	1.82	1.83	1.84	1.85	1.86
1.87	1.88	1.89	1.90	1.91	1.92
1.93	1.94	1.95	1.96	1.97	1.98
1.99	2.00	2.01	2.02	2.03	2.04
2.05	2.06	2.07	2.08	2.09	2.10
2.11	2.12	2.13	2.14	2.15	2.16
2.17	2.18	2.19	2.20	2.21	2.22
2.23	2.24	2.25	2.26	2.27	2.28
2.29	2.30	2.31	2.32	2.33	2.34
2.35	2.36	2.37	2.38	2.39	2.40
2.41	2.42	2.43	2.44	2.45	2.46
2.47	2.48	2.49	2.50	2.51	2.52
2.53	2.54	2.55	2.56	2.57	2.58
2.59	2.60	2.61	2.62	2.63	2.64
2.65	2.66	2.67	2.68	2.69	2.70
2.71	2.72	2.73	2.74	2.75	2.76
2.77	2.78	2.79	2.80	2.81	2.82
2.83	2.84	2.85	2.86	2.87	2.88
2.89	2.90	2.91	2.92	2.93	2.94
2.95	2.96	2.97	2.98	2.99	3.00
3.01	3.02	3.03	3.04	3.05	3.06
3.07	3.08	3.09	3.10	3.11	3.12
3.13	3.14	3.15	3.16	3.17	3.18
3.19	3.20	3.21	3.22	3.23	3.24
3.25	3.26	3.27	3.28	3.29	3.30
3.31	3.32	3.33	3.34	3.35	3.36
3.37	3.38	3.39	3.40	3.41	3.42
3.43	3.44	3.45	3.46	3.47	3.48
3.49	3.50	3.51	3.52	3.53	3.54
3.55	3.56	3.57	3.58	3.59	3.60
3.61	3.62	3.63	3.64	3.65	3.66
3.67	3.68	3.69	3.70	3.71	3.72
3.73	3.74	3.75	3.76	3.77	

RUNOFF HYDROGRAPH TO-ENGLISHTOWN LAKE

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JFRT	INAME	IUSAGE	IAUTO
-----	-----	-----	-----	-----	-----	-----	-----	-----
PONT-	0	0	0	0	0	-	0	0

HYDROGRAPH DATA

IMYIG	IUNG	TAREA	SNAP
1	2	7.20	0.00

PRECIP DATA	
SPFE	PMS
0.00	23.20
	113.00
	124.00
	132.00

TRASPAC COMPUTED-RY-THE-PROGRAM-19---800-

**LOSS DATA**

ALROPT	STRKR	ULTR	RIOL	ERAIN	STRKS	RTIOK	STRIL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT-HYDROGRAPH DATA  
IC= 0.00 LAG= 3.27

```
-----RECESSION DATA-----
STRIDE= -1.50  QRCSN= -.00
```

[illegible]

SUM	26.36	23.96	2.39	650790.
	( 669.)	( 609.)	( 61.)	(18428.32)

1. The first part of the document is a title page. It contains the title "THE HISTORY OF THE UNITED STATES OF AMERICA" and the author "BY JAMES MADISON".

2. The second part of the document is a preface. It contains the text "I have the honor to acknowledge the receipt of your letter of the 10th inst. and in reply to inform you that the same has been forwarded to the proper authorities for their consideration."

3. The third part of the document is the main body of the text. It contains the text "The first part of the document is a title page. It contains the title 'THE HISTORY OF THE UNITED STATES OF AMERICA' and the author 'BY JAMES MADISON'."

4. The fourth part of the document is a conclusion. It contains the text "I have the honor to acknowledge the receipt of your letter of the 10th inst. and in reply to inform you that the same has been forwarded to the proper authorities for their consideration."

## HYDROGRAPH ROUTING

## ROUTING THROUGH ENGLISH TOWN LAKE DAM

ISIAQ	ICOMP	IECON	ITAPE	JPLY	JPRI	INAME	ISTAGE	IAUTO
1	1	0	0	0	0	1	0	0

ROOTING DATA					
---AVG---	---IRES---	---ISANE---	---IDPT---	---IPMP---	---LSTR---
0.0	0.000	1	1	0	0
0.0	0.000	0.00	0	0	0

NSTPS	NSTEL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-72.	-1

[illegible]

100.00	0.00	175.00	701.00	1080.00	1509.00	1984.00	2500.00	3055.00	3645.00
--------	------	--------	--------	---------	---------	---------	---------	---------	---------

SURFACE AREA=	0.	7.	209.	1000.
---------------	----	----	------	-------

CAPACITY= 0. 24. 689. 11797.

ELEVATION=	62.	72.	80.	100.
------------	-----	-----	-----	------

CREL	SFWD	COBW	EXPW	ELEV	COOL	CAREA	EXPL
72.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA			
TOPEL	COORD	EXPD	DAMWID
75.0	2.6	1.5	280

Sh. 8

PEAK OUTFLOW IS 149. AT TIME 43.83 HOURS

PEAK OUTFLOW IS 298. AT TIME 43.83 HOURS

PEAK OUTFLOW IS 440. AT TIME 44.00 HOURS

PEAK OUTFLOW IS 576. AT TIME 44.00 HOURS

PEAK OUTFLOW IS 729. AT TIME 44.00 HOURS

PEAK OUTFLOW IS 917. AT TIME 43.67 HOURS

PEAK OUTFLOW IS 1091. AT TIME 43.67 HOURS

PEAK OUTFLOW IS 1259. AT TIME 43.50 HOURS

PEAK OUTFLOW IS 7874. AT TIME 43.50 HOURS

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS  
FLOWS IN CURIC FEET PER SECOND (CUBIC METERS PER SECOND)  
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIO 1	RATIO 2	RATIO 3	RATIO 4	RATIO 5	RATIO 6	RATIO 7	RATIO 8	RATIO 9
RATIOS APPLIED TO FLOWS												
HYDROGRAPH AT	POND	7.20	1	164.	329.	473.	658.	822.	985.	1151.	1315.	8217.
	( 18.65)	( 4.65)	( 9.31)	( 13.96)	( 18.62)	( 23.27)	( 27.93)	( 32.58)	( 37.24)	( 41.90)	( 46.55)	( 51.20)
ROUTED TO	DAM	7.20	1	149.	298.	440.	576.	729.	917.	1091.	1259.	7874.
	( 18.65)	( 4.22)	( 8.44)	( 12.45)	( 16.32)	( 20.64)	( 25.96)	( 30.90)	( 35.65)	( 40.30)	( 45.00)	( 49.70)

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	72.15	72.15	75.00
STORAGE	24.	24.	93.
OUTFLOW	0.	0.	653.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.01	73.21	0.00	36.	149.	0.00	43.83	0.00
.02	73.81	0.00	50.	298.	0.00	43.83	0.00
.03	74.33	0.00	66.	440.	0.00	44.00	0.00
.04	74.76	0.00	82.	576.	0.00	44.00	0.00
.05	75.13	.13	100.	729.	2.00	44.00	0.00
.06	75.34	.34	111.	917.	3.50	43.67	0.00
.07	75.50	.50	120.	1091.	4.50	43.67	0.00
.08	75.64	.64	129.	1259.	5.00	43.50	0.00
.50	78.86	3.86	478.	7874.	12.33	43.50	0.00

Shed

APPENDIX

D

Photographs

APPENDIX D  
SELECTED PHOTOGRAPHS OF THE SITE

Page No.

Site Plan A

PHOTOGRAPH NO.

1.	Upstream face of the dam as observed from the right abutment. (4/30/81)	1
2.	View of the deteriorated spillway looking towards the right abutment. (4/30/81)	1
3.	View of the deteriorated spillway looking towards the left abutment. (4/30/81)	2
4.	Spillway and reservoir drain gate as seen from beneath the highway bridge. (4/30/81)	2
5.	Reservoir drain gate observed from the bridge deck. (4/30/81)	3
6.	Reservoir drain gate and deteriorated concrete of the spillway structure. (4/30/81)	3
7.	General view of the impoundment from the crest of the dam. (4/30/81)	4
8.	Looking upstream through the highway to the spillway. (4/30/81)	4
9.	The left downstream abutment wall of the bridge. (4/30/81)	5
10.	The right downstream abutment wall of the bridge. (4/30/81)	5
11.	Potential damage area about 200 feet downstream of the dam. (4/30/81)	6
12.	Potential damage area about 1,500 feet downstream of the dam. (4/30/81)	6





O'BRIEN & GERE  
ENGINEERS, INC.

SUB. 1.

# ENGLISHTOWN LAKE DAM

SHEET

BY

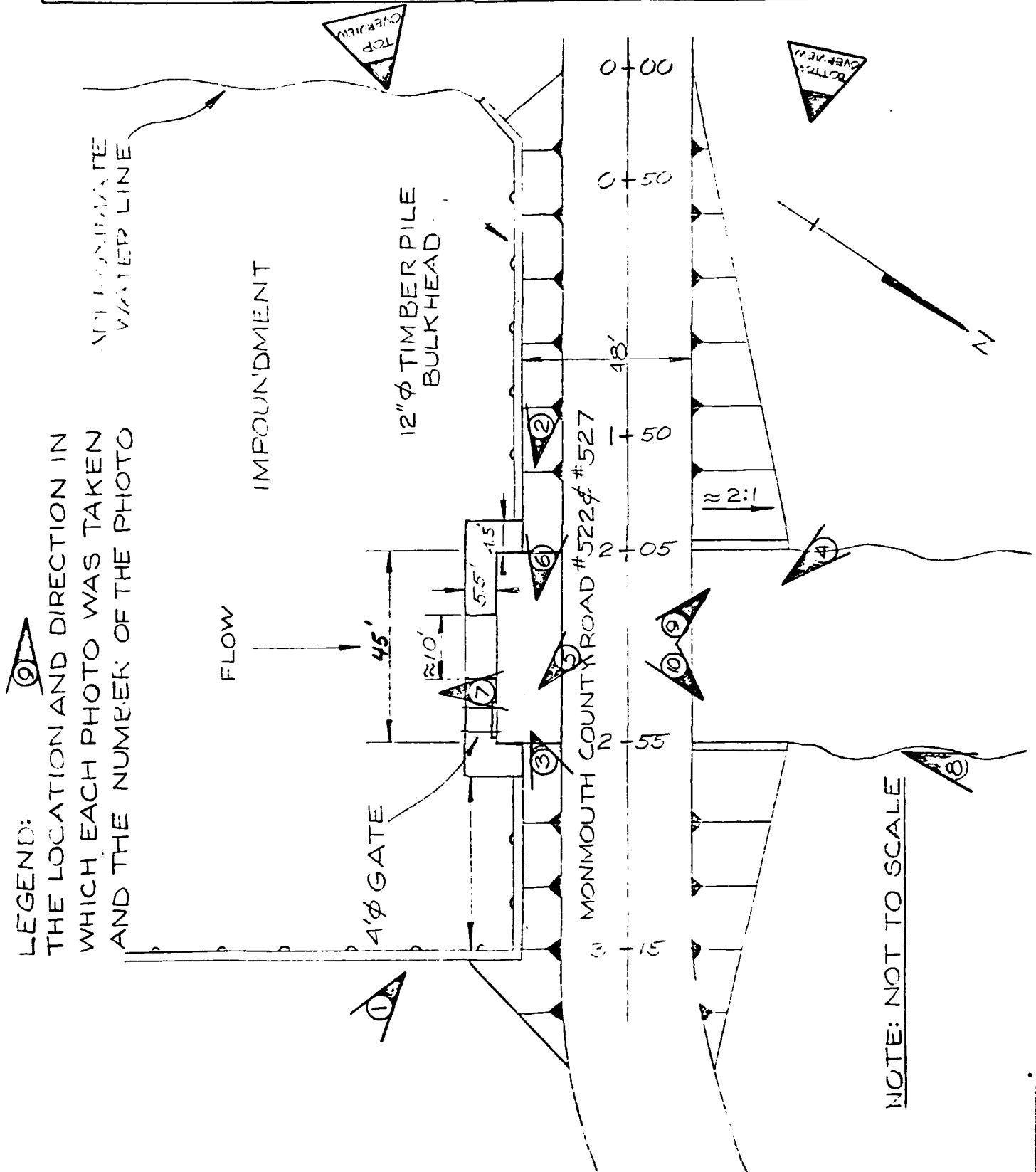
RAE

DATE

6/19/81

JOB NO.

1800-006-114

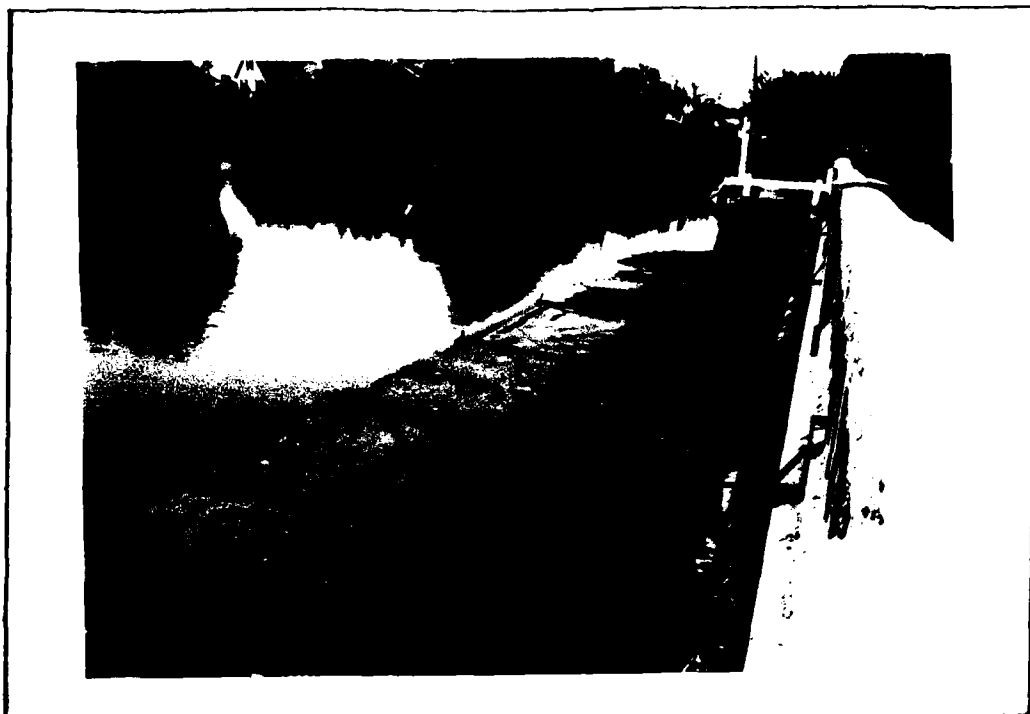




1. UPSTREAM FACE OF THE DAM AS OBSERVED FROM THE RIGHT ABUTMENT.  
(4/30/81)



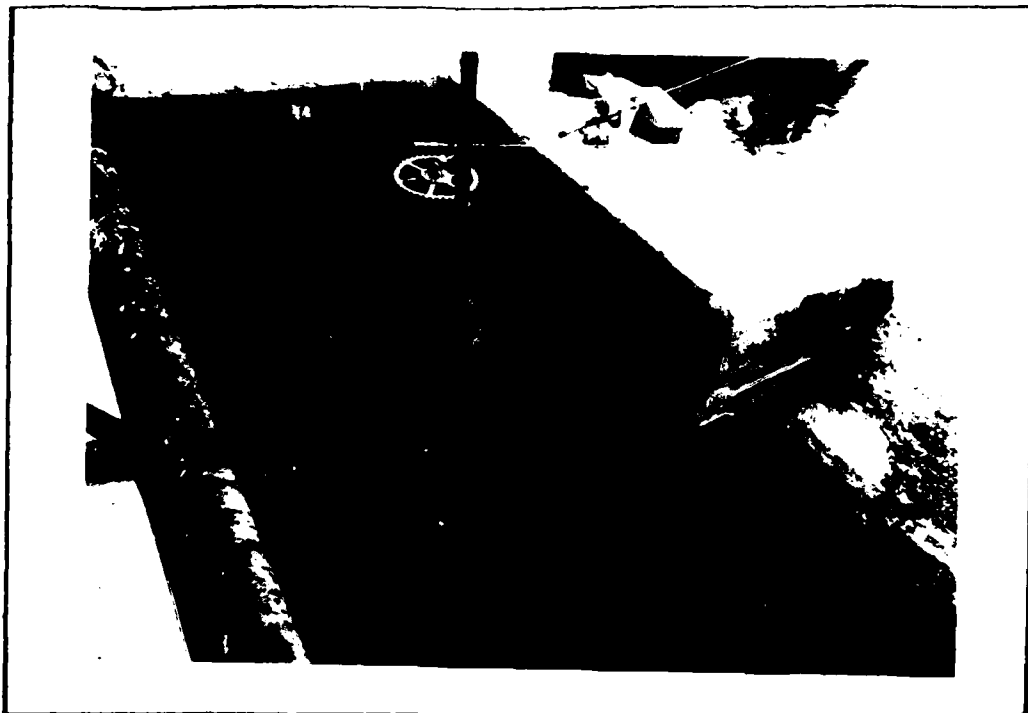
2. VIEW OF THE DETERIORATED SPILLWAY LOOKING TOWARDS THE RIGHT  
ABUTMENT. (4/30/81)



3. VIEW OF THE DETERIORATED SPILLWAY LOOKING TOWARDS THE LEFT ABUTMENT. (4/30/81)



4. SPILLWAY AND RESERVOIR DRAIN GATE AS SEEN FROM BENEATH THE HIGHWAY BRIDGE. (4/30/81)



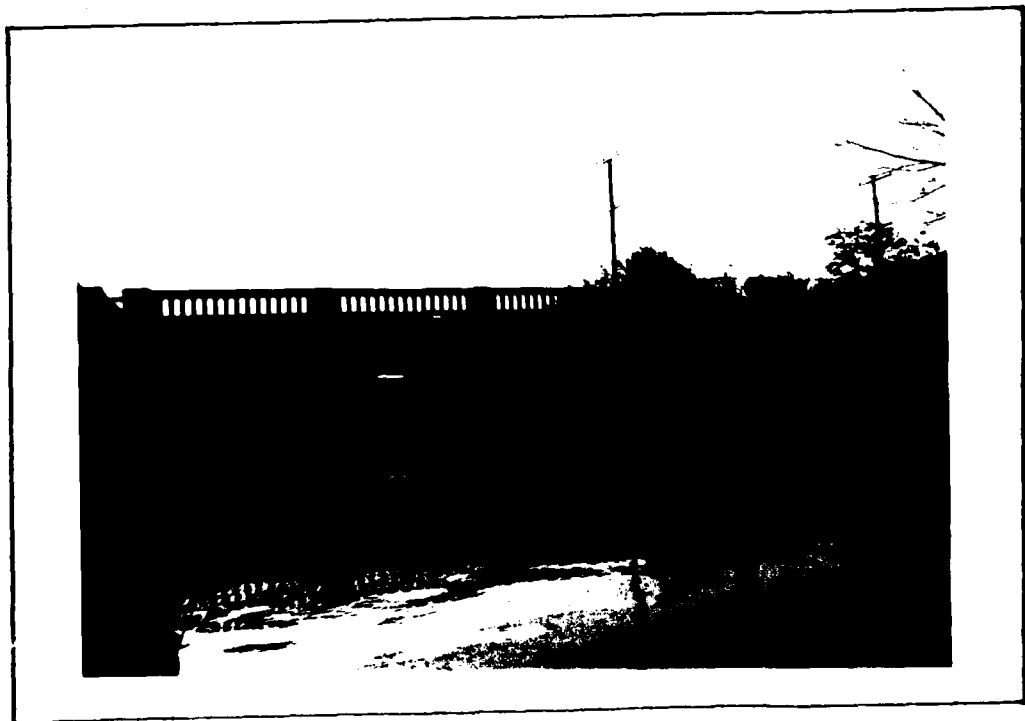
5. RESERVOIR DRAIN GATE OBSERVED FROM THE BRIDGE DECK. (4/30/81)



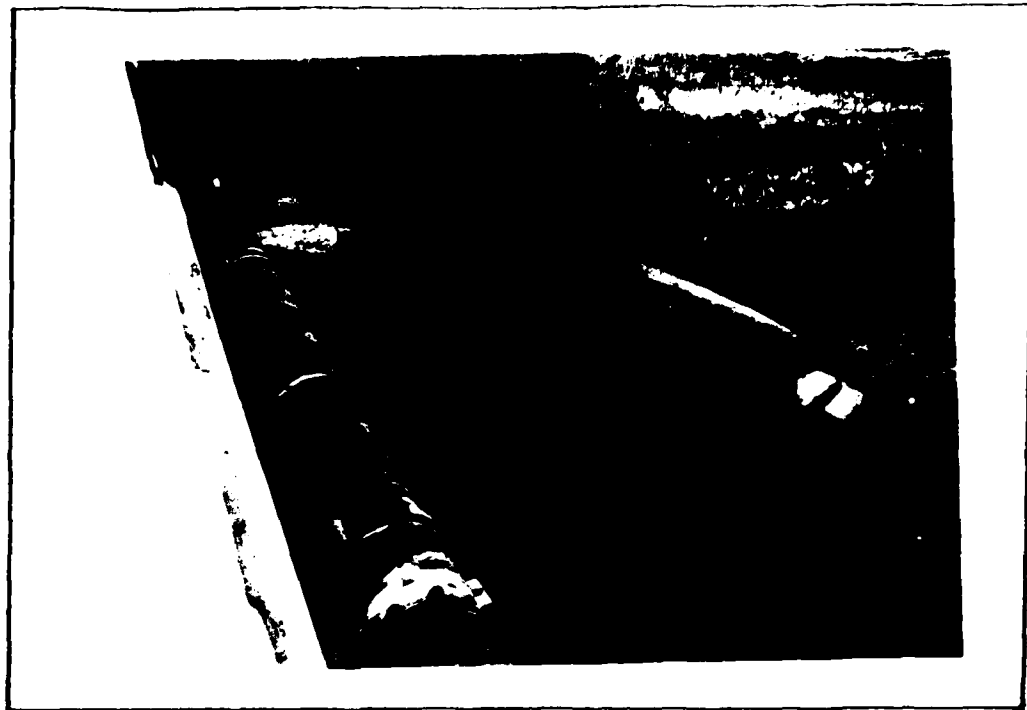
6. RESERVOIR DRAIN GATE AND DETERIORATED CONCRETE OF THE SPILLWAY STRUCTURE AND THE HIGHWAY BRIDGE. (4/30/81)



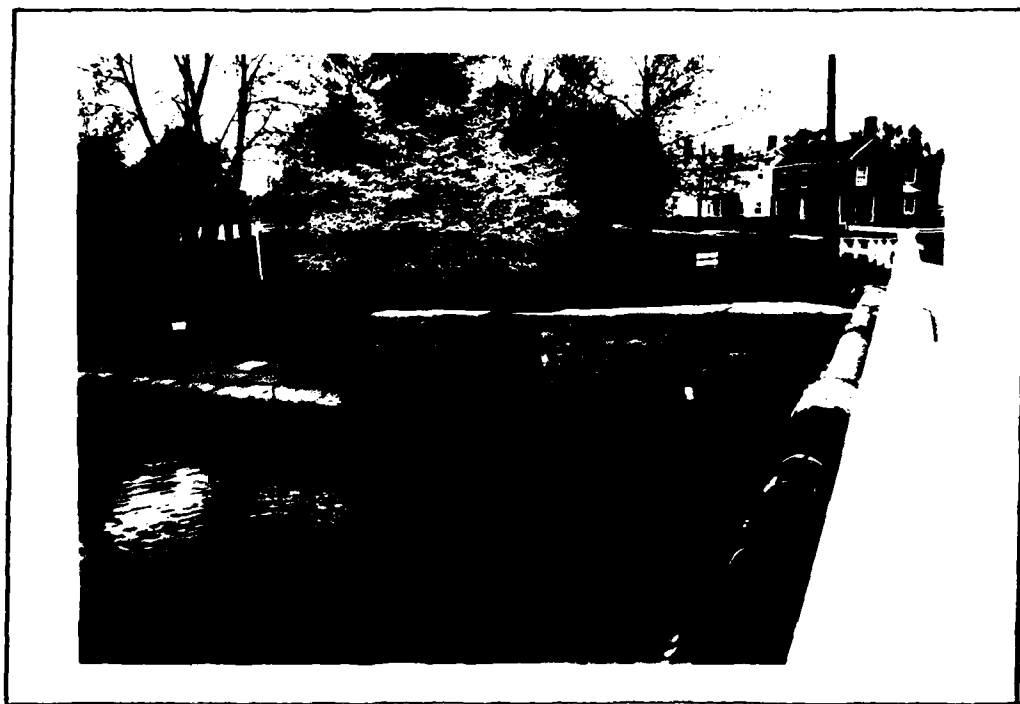
7. GENERAL VIEW OF THE IMPOUNDMENT FROM THE CREST OF THE DAM.  
(4/30/81)



8. LOOKING UPSTREAM THROUGH THE HIGHWAY TO THE SPILLWAY.  
(4/30/81)



9. THE LEFT DOWNSTREAM ABUTMENT WALL OF THE BRIDGE. (4/30/81)



10. THE RIGHT DOWNSTREAM ABUTMENT WALL OF THE BRIDGE. (4/30/81)



11. POTENTIAL DAMAGE AREA ABOUT 200 FEET DOWNSTREAM OF THE DAM.  
(4/30/81)



12. POTENTIAL DAMAGE AREA ABOUT 1,500 FEET DOWNSTREAM OF THE DAM.  
(4/30/81)

## APPENDIX

E

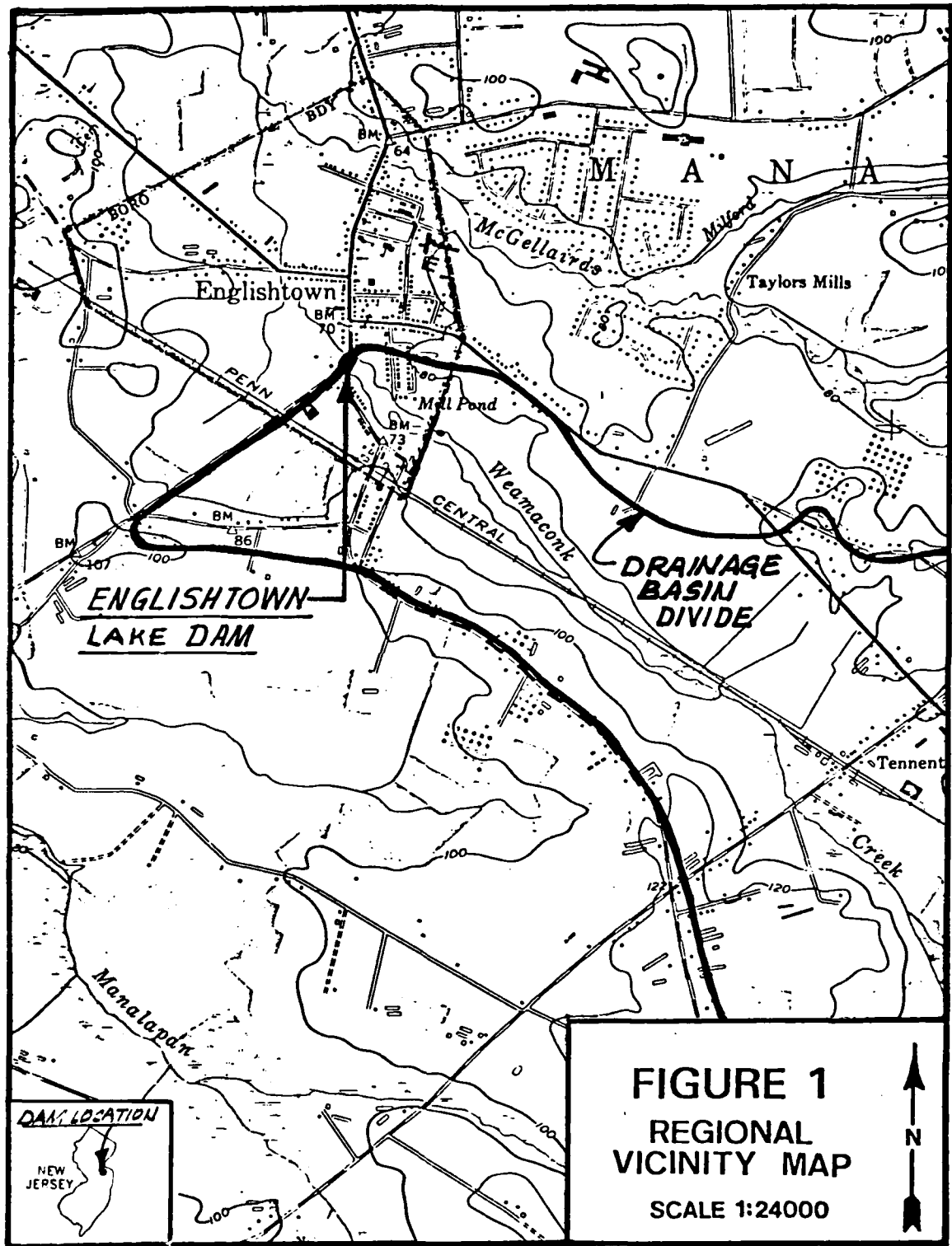
Drawings



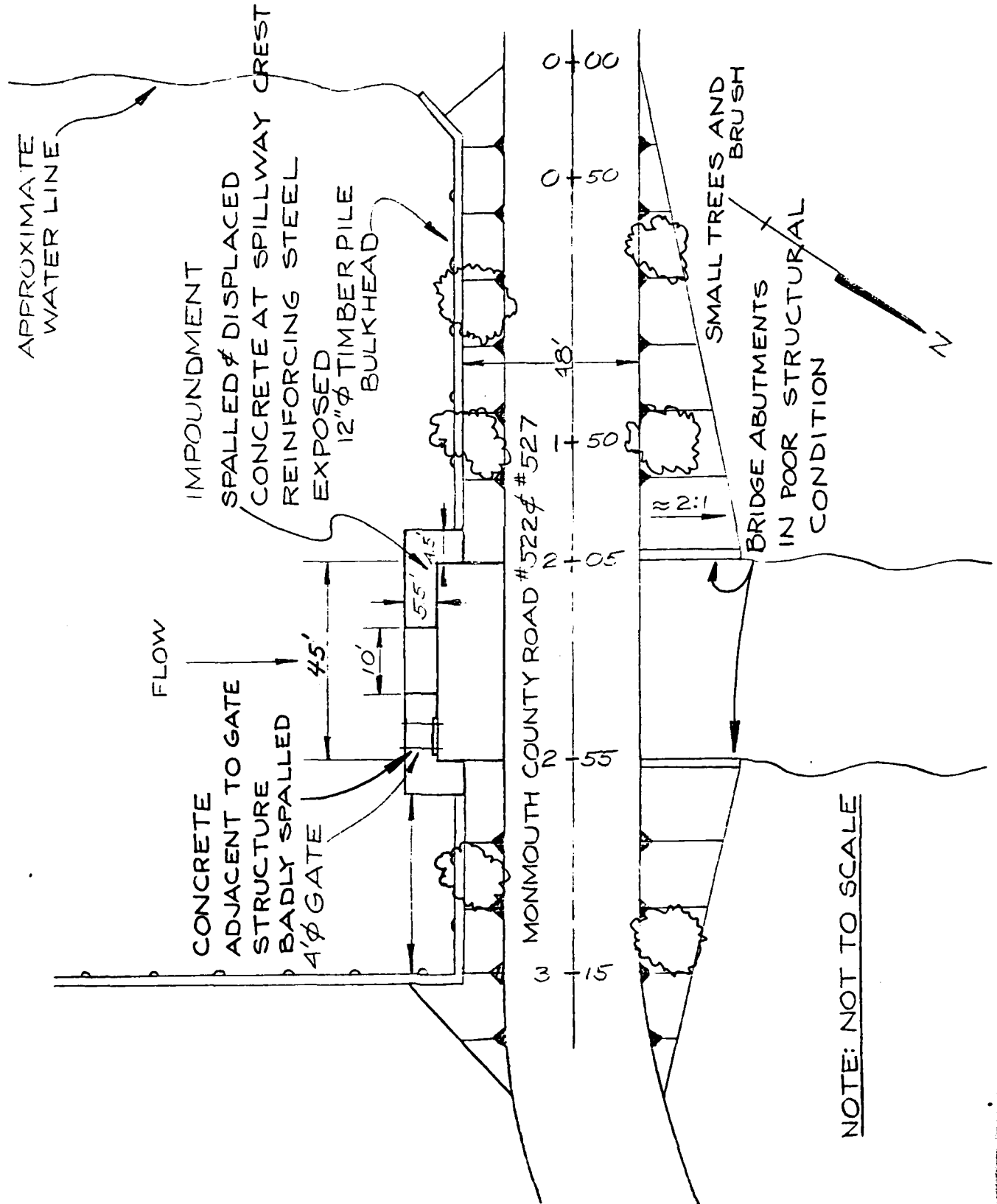
APPENDIX E  
TABLE OF CONTENTS

DRAWINGS

	<u>Sheet No.</u>
Regional Vicinity Map, Figure 1	1
Plan View of Dam Showing Problem Areas	2
Typical Embankment Section and Spillway Section	3

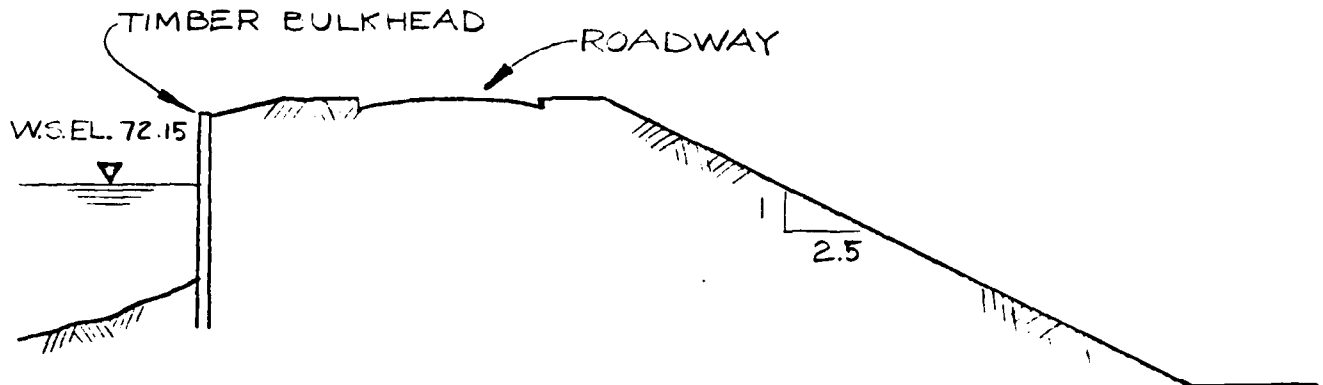


Sub	ENGLISHTOWN LAKE DAM	SHEET	2	By	RAB	Date	6/19/81	Job No.	1800-006-114
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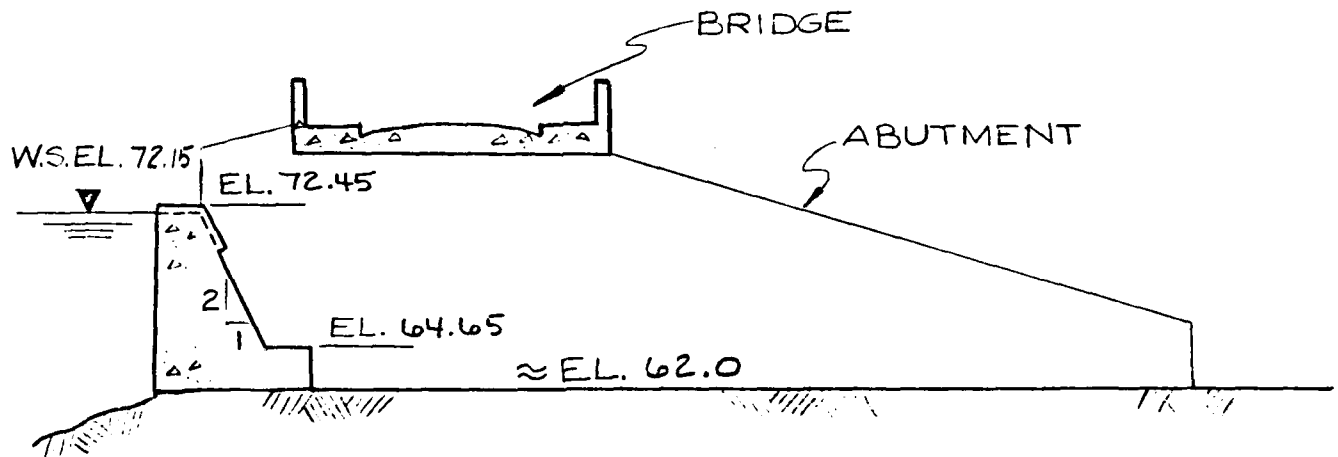


SUBJECT	ENGLISHTOWN LAKE DAM	SHEET	3	BY	RAB	DATE	6/19/81	JOB NO	1800-006-114
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TYPICAL EMANKMENT SECTION



SPILLWAY SECTION



NOTE: NOTE TO SCALE

## APPENDIX

F

Site Geology

## SITE GEOLOGY

### ENGLISHTOWN LAKE DAM

Englishtown Lake Dam is located in Monmouth County within the northwesterly limits of the Atlantic Coastal Plain physiographic province. The site appears to be underlain by Cretaceous age marine sediments consisting of the Marshalltown formation and the older Englishtown formation. Both formations strike about N.70° E. and dip about 18-20 feet per mile to the southeast. While the Englishtown is basically a fine to medium grain sand with some clay zones, the Marshalltown formation is generally a black sandy clay with considerable amounts of glauconite, an iron potassium silicate.

Bedrock is estimated to be about 300 feet below the ground surface in the project area and consists of Paleozoic metamorphics, probably deeply weathered.

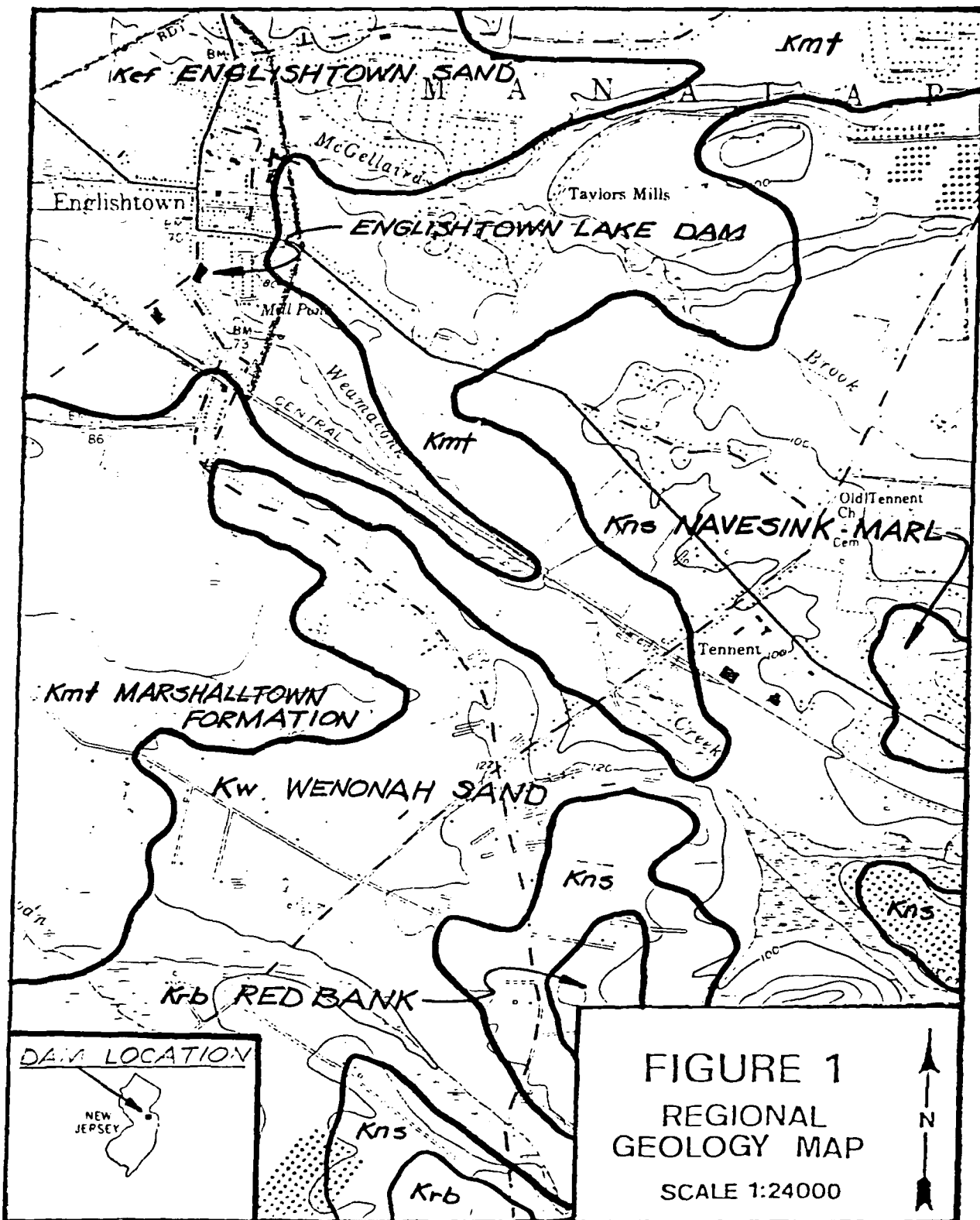


FIGURE 1  
REGIONAL  
GEOLOGY MAP  
SCALE 1:24000

